Math 1432 Spring 2018: Exam 2 Review
Professor William Ott

Exam 2 will cover the material in Sections 5.5, 7.1–7.4, 7.8, 8.1–8.2, 8.3 (moments and centers of mass), and 10.1–10.4 of *Calculus: Early Transcendentals* (Edition 8E) by James Stewart. Possible exercise types include true/false questions, statements of definitions and major results, computational exercises, and exercises requiring theoretical arguments. At least one of the exercises from Section 5 and at least one of the theoretical arguments in Section 4 will appear on Exam 2.

1. Definitions

You should be able to define and use the following.

(1) Antiderivative
(2) Riemann sums, Riemann definite integral
(3) Indefinite integral
(4) Arc length function (pg. 547)
(5) Polar coordinates

2. Computational techniques

(1) Compute two-sided limits and one-sided limits
(2) Compute limits at infinity
(3) Compute derivatives using the differentiation rules (power rule, sum rule, difference rule, constant multiple rule, product rule, quotient rule, chain rule)
(4) Differentiation of exponential functions, logarithms, trigonometric functions, and inverse trigonometric functions
(5) Integration techniques
- Integrands with easily recognizable antiderivatives
- Substitution
- Integration by parts
- Trigonometric integrals (involving sine, cosine, tangent, and secant)
- Trigonometric substitution (involving sine, cosine, tangent, and secant)
- Integration of rational functions by partial fraction decomposition (only consider the case of no repeated linear or quadratic factors)

(6) Compute improper integrals
- Integrals involving infinite limits of integration ($-\infty$, ∞, or both)
- Integrands with a discontinuity at the left or right limit of integration

(7) Arc length (for curves defined via $y = f(x)$)
(8) Area of a surface of revolution (Be ready to handle cases such as Gabriel's horn that involve improper integrals.)
(9) Moments, center of mass
(10) Parametric curves
- Be ready to parametrize simple objects such as circles, rays, and line segments.
- Parametric calculus (tangents to parametric curves, areas, arc length)

(11) Calculus of polar curves (tangents, areas, arc length)

3. Theoretical results

You should know and be able to apply the following.

(1) Rolle's theorem, mean value theorem
(2) Properties of the Riemann integral (see pgs. 385–388)

(3) Fundamental theorem of calculus, parts I and II
(4) Symmetry principle (pg. 562)
(5) Theorem of Pappus (pg. 565)

4. Proofs/Derivations

(1) Theorem of Pappus (pg. 565)
(2) Derivation of arc length Eq. 3 (pg. 652) from arc length Eq. 2 (pg. 652).

5. Suggested problems

Study Assignments 4–6. Focus on exercises that are not too computationally involved and that are at most moderately difficult.